

RESULTS FROM THE PHOENIX ATMOSPHERIC STRUCTURE EXPERIMENT

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ABSTRACT

During its brief flight through the atmosphere of Mars, Phoenix recorded acceleration and angular velocity data using accelerometers and gyroscopes within an inertial measurement unit. These time series data, which constitute the Experimental Data Records (EDRs) of the Phoenix Atmospheric Structure Experiment (ASE), are available from the NASA Planetary Data System (PDS). This presentation will describe the methods used to produce Reduced Data Records (RDRs) from the EDRs. These RDRs, which include a reconstruction of Phoenix's trajectory through the atmosphere and associated vertical profiles of atmospheric density, pressure and temperature, are being prepared for delivery to the Atmospheres Node of the PDS.

This presentation will include technical discussion of certain aspects of the reconstruction and scientific evaluation of the atmospheric profile. Highlighted technical features will include errors in the archived EDRs that were caused by the use of a preliminary version of a transformation matrix between two frames, unbiased approaches to reducing noise in exponentially increasing acceleration measurements by averaging, properties of the reconstructed trajectory, and the angle of attack history. Highlighted scientific features will include comparison of the Phoenix profile to pre-flight predictions and complementary observations by the Mars Climate Sounder instrument on Mars Reconnaissance Orbiter, comparison to landed meteorological measurements from Phoenix, possible relationships between high temperatures at 70-90 km and atmospheric tides, and mesopause conditions.